FIG. 1

ATGATGGTGGATCCCAATGGCAATGAATCCAGTGCTACATACTTCATCCTAATAGGCCTC
CCTGGTTTAGAAGAGGCTCAGTTCTGGTTGGCCTTCCCATTGTGCTCCCTCTACCTTATT
GCTGTGCTAGGTAACTTGACAATCATCTACATTGTGCGGACTGAGCACAGCCTGCATGAG
CCCATGTATATATTTCTTTGCATGCTTTCAGGCATTGACATCCTCATCTCCACCTCATCC
ATGCCCAAAATGCTGGCCATCTTCTGGTTCAATTCCACTACCATCCAGTTTGATGCTTGT
CTGCTACAGATGTTTGCCATCCACTCCTTATCTGGCATGGAATCCACAGTGCTGCTGGCC
ATGGCTTTTGACCGCTATGTGGCCATCTGTCACCCACTGCGCCATGCCACAGTACTTACG
TTGCCTCGTGTCACCAAAATTGGTGTGGCTGCTGTGGTGCGGGGGGCTGCACTGATGGCA
CCCCTTCCTGTCTTCATCAAGCAGCTGCCCTTCTGCCGCTCCAATATCCTTTCCCATTCC
TACTGCCTACACCAAGATGTCATGAAGCTGGCCTGTGATGATATCCGGGTCAATGTCGTC
TATGGCCTTATCGTCATCATCTCCGCCATTGGCCTGGACTCACTTCTCATCTCCTTCTCA
TATCTGCTTATTCTTAAGACTGTGTTGGGCTTGACACGTGAAGCCCAGGCCAAGGCATTT
GGCACTTGCGTCTCTCATGTGTGTGCTGTGTTCATATTCTATGTACCTTTCATTGGATTG
TCCATGGTGCATCGCTTTAGCAAGCGGCGTGACTCTCCGCTGCCCGTCATCTTGGCCAAT
ATCTATCTGCTGGTTCCTCCTGTGCTCAACCCAATTGTCTATGGAGTGAAGACAAAGGAG
ATTCGACAGCGCATCCTTCGACTTTTCCATGTGGCCACACACGCTTCAGAGCCCTAG

FIG. 2

MMVDPNGNESSATYFILIGLPGLEEAQFWLAFPLCSLYLIAVLGNLTIIYIVRTEHSLHE
PMYIFLCMLSGIDILISTSSMPKMLAIFWFNSTTIQFDACLLQMFAIHSLSGMESTVLLA
MAFDRYVAICHPLRHATVLTLPRVTKIGVAAVVRGAALMAPLPVFIKQLPFCRSNILSHS
YCLHQDVMKLACDDIRVNVVYGLIVIISAIGLDSLLISFSYLLILKTVLGLTREAQAKAF
GTCVSHVCAVFIFYVPFIGLSMVHRFSKRRDSPLPVILANIYLLVPPVLNPIVYGVKTKE
IRQRILRLFHVATHASEP

FIG. 3

CCACGCGTCCGCTCTGCCCTGAATCCAGGATAGACCAGGACAACAAGATGAGTGGCTAAC
TGTAGGATGGTGTCCATCTGTGCTCTAGGGGAGGAGTAGCATCAAAGGAGAAGCAAGAAC
TGAGAACTGTTTGGGGCACTGAAGAAGTAGGACTAAGGAAGAGTTAGGGGGTTAGTACAA
ATCTGAGGCCTGGTTTTCTGGAAAGAGACCAGAGACTGACCTTATTGCATGTCATACAAC
ATGCTTGCTTAGAGACCCCTAATTTATTTTCTTCTCTTACTCTTTCTGAGGAAGCATGAG
CCACACCCTCAGTTAGTTTTGTATAATCTTAGGCTTGATGAGAATATAATCTTAGTCTTG
AAGGCTTTAAAGGGGAAGAAATAGCTGTCTGTGTTAGTGGTGTGTCAGTCAGCAGGAGAA
CCTGCTAGGGGTGGAAGGAGGAGGGTAGGAGTATAGCCTAGACCATGAGTAGATACCCCG
CTCCACCTTGAAAGTCTCCTACTGGACCTCTTATGATGGAGTTAATACCTCCTGTTTCCT
CTATTCCAGATTGTTTTCAGTTTCCAGAAGGCAAAACTGACATCTCCCAGGAGTCCAAGT
AGGAGATTAGGGCCTCCCGTCCCTATCTACTCAGTGCTAGCCTTGGCTAAGAGAGAGGAA
ATTCCTGCCTAGAGGGGAAAATCTGCAGGACTTCGTTACCACTTTCACTTTGGCAGAGGA
AGGAGGTCAGGGATGGAAGGGGAAGTGAGTCTAGAAATTAAAACATAGAATTCTGTCTAC
AGGTGGTGGAGAGCCTTTCTGAAAGTGCTTCTGGGTTGAGGCTGTCACCTAGATTTTATA
TTAGAGTTTAAGTGTTCCAAAAAATTAAGAAGCAGGAAGTAGAAAAGAGAACAATTTCAG
AAGCAGACGAAAGGAACAGTAATAGGAAGATCTAGCAAGGATGTGGTGGGGCAGTTTCAG
TGTGAGATGCCATGGACAGGAAAATGGCAGCATATGTGTGTGTGTGTGTGTGTGTGTGTG
TCCATGAGACAGAGAGACATAAATAACTAAATAAAAAGGCATATCACAAAGAGGGGCTCC
TGCTTCAGCTTGAGTCCTGGATGCAAAGACATGTGGACTGGGATCCTAGCAACCTATCTG
CAGCCAAGGACATGACGTTAGACGCCCCAAGAAAAGGAAAATTGGTCAAACATAGGAAGA
GCACTCAAGTGCCAGCTACAGTGAATGACAAATACCCACCACAAGCACAAGCTCTACATT
CACAAAAACTTGGAAAACACAAGTTCATAGACTGGGCAACCCTGAGTAGTGGAGAGATCA
CCAGCCATGTTTCAGGTTGTACCCTCTACCTGCCTGGTGCTGGTCACAGTTCAGCTTCTT
C

FIG. 4

```
GTGTCAGTGATCAAACTTCTTTTCCATTCAGAGTCCTCTGATTCAGATTTTAATGTTAAC
ATTTTGGAAGACAGTATTCAGAAAAAAAATTTCCTTAATAAAAATACAACTCAGATCCTT
CAAATATGAAACTGGTTGGGGAATCTCCATTTTTTCAATATTATTTTCTTCTTTGTTTTC
TTGCTACATATAATTATTAATACCCTGACTAGGTTGTGGTTGGAGGGTTATTACTTTTCA
TTTTACCATGCAGTCCAAATCTAAACTGCTTCTACTGATGGTTTACAGCATTCTGAGATA
AGAATGGTACATCTAGAGAACATTTGCCAAAGGCCTAAGCACGGCAAAGGAAAATAAACA
CAGAATATAATAAAATGAGATAATCTAGCTTAAAACTATAACTTCCTCTTCAGAACTCCC
AACCACATTGGATCTCAGAAAAATACTGTCTTCAAAATGACTTCTACAGAGAAGAAATAA
TTTTTCCTCTGGACACTAGCACTTAAGGGGAAGATTGGAAGTAAAGCCTTGAAAAGAGTA
CATTTACCTACGTTAATGAAAGTTGACACACTGTTCTGAGAGTTTTCACAGCATATGGAC
CCTGTTTTTCCTATTTAATTTTCTTATCAACCCTTTAATTAGGCAAAGATATTATTAGTA
CCCTCATTGTAGCCATGGGAAAATTGATGTTCAGTGGGGATCAGTGAATTAAATGGGGTC
ATACAAGTATAAAAATTAAAAAAAAAAGACTTCATGCCCAATCTCATATGATGTGGAAGA
ACTGTTAGAGAGACCAACAGGGTAGTGGGTTAGAGATTTCCAGAGTCTTACATTTTCTAG
AGGAGGTATTTAATTTCTTCTCACTCTCTCCAGTGTTGTATTTAGGAATTTCCTGGCAAC
AGAACTCATGGCTTTAATCCCACTAGCTATTGCTTATTGTCCTGGTCCAATTGCCAATTA
CCTGTGTCTTGGAAGAAGTGATTTCTAGGTTCACCATTATGGAAGATTCTTATTCAGAAA
GTCTGCATAGGGCTTATAGCAAGTTATTTATTTTTAAAAGTTCCATAGGTGATTCTGATA
GGCAGTGAGGTTAGGGAGCCACCAGTTATGATGGGAAGTATGGAATGGCAGGTCTTGAAG
ATAACATTGGCCTTTTGAGTGTGACTCGTAGCTGGAAAGTGAGGGAATCTTCAGGACCAT
GCTTTATTTGGGGCTTTGTGCAGTATGGAACAGGGACTTTGAGACCAGGAAAGCAATCTG
ACTTAGGCATGGGAATCAGGCATTTTTGCTTCTGAGGGGCTATTACCAAGGGTTAATAGG
TTTCATCTTCAACAGGATATGACAACAGTGTTAACCAAGAAACTCAAATTACAAATACTA
AAACATGTGATCATATATGTGGTAAGTTTCATTTTCTTTTTCAATCCTCAGGTTCCCTGA
TATGGATTCCTATAACATGCTTTCATCCCCTTTTGTAATGGATATCATATTTGGAAATGC
CTATTTAATACTTGTATTTGCTGCTGGACTGTAAGCCCATGAGGGCACTGTTTATTATTG
AATGTCATCTCTGTTCATCATTGACTGCTCTTTGCTCATCATTGAATCCCCCAGCAAAGT
GCCTAGAACATAATAGTGCTTATGCTTGACACCGGTTATTTTTCATCAAACCTGATTCCT
TCTGTCCTGAACACATAGCCAGGCAATTTTCCAGCCTTCTTTGAGTTGGGTATTATTAAA
TTCTGGCCATTACTTCCAATGTGAGTGGAAGTGACATGTGCAATTTCTATACCTGGCTCA
TAAAACCCTCCCATGTGCAGCCTTTCATGTTGACATTAAATGTGACTTGGGAAGCTATGT
GTTACACAGAGTAAATCACCAGAAGCCTGGATTTCTGAAAAAACTGTGCAGAGCCAAACC
TCTGTCATTTGCAACTCCCACTTGTATTTGTACGAGGCAGTTGGATAAGTGAAAAATAAA
GTACTATTGTGTCAAGTCAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
```

FIG. 5

MMVDPNGNES SATYFILIGL PGLEEAQ**FWL AFPLCSLYLI AVLGNLTIIY**
IVRTEHSLHE PMY**IFLCMLS GIDILISTSS MPKMLAIFW**F NSTTIQFDAC
LLQM**FAIHSL SGMESTVLLA MAFDRYVAIC** HPLRHATVLT LPRVTK**IGVA**
AVVRGAALMA PLPVFIKQLP FCRSNILSHS YCLHQDVMKL ACDDIR**VNVV**
YGLIVIISAI GLDSLLISFS YLLILKTVLG LTREAQAKA**F GTCVSHVCAV**
FIFYVPFIGL SMVHRFSKRR DSP**LPVILAN IYLLVPPVLN PIVYGV**KTKE
IRQRILRLFH VATHASEP

FIG. 6A

```
Q9WVN4    ~~~~~~MWP.NSSDA.P..FLLTGFLGLEMIHHWISIPFFVIYFSIIVGNGTLLFIIWSD
Q9WVN5    ~~~~~~MWS.NISAA.P..FLLTGFPGLEAAHHWISIPFFAIYISVLLGNGTLLYLIKDD
Q9Y5P1    ~~~~~~MWP.NITAA.P..FLLTGFPGLEAAHHWISIPFFAVYVCILLGNGMLLYLIKHD
Q9YH55    ~~~~~~MYPRNSSQAQP..FLLAGLPGMAQFHHWVFLPFGLMYLVAVLGNGTILLVVRVH
HGPRBMY4  ~~~~~MMVDPNGNESSATYFILIGLPGLEEAQFWLAFPLCSLYLIAVLGNLTIIYIVRTE
O88628    ~~~~~~~~MSSCNFTHAT.FMLIGIPGLEEAHFWFGFPLLSMYAVALFGNCIVVFIVRTE
Q9WU89    MNSKASMLGTNFTIIHPTVFILLGIPGLEQYHTWLSIPFCLMYIAAVLGNGALILVVLSE
Q9WVD9    ~~MKVASSFHNDTNPQDVWYVLIGIPGLEDLHSWIAIPICSMYIVAVIGNVLLIFLIVTE
Q9WU93    ~~~~~~MSPGNSSWIHPSSFLLLGIPGLEELQFWLGLPFGTVYLIAVLGNVIILFVIYLE
Q9WVD7    ~~~~~~MIKFNGSVFMPSVLTLVGIPGLESVQCWIGIPFCVMYIIAMIGNSLILVIIKSE

Q9WVN4    HSLHEPMYYFLAVLASMDLGMTLTTMPTVLGVLVLNQREIVHGACFIQSYFIHSLAIVES
Q9WVN5    HNLHEPMYYFLAMLAGTDLTVTLTTMPTVMAVLWVNHREIRHGACFLQAYIIHSLSIVES
Q9Y5P1    HSLHEPMYYFLTMLAGTDLMVTLTTMPTVMGILWVNHREISSVGCFLQAYFIHSLSVVES
Q9YH55    RQLHQPMYYFLLMLATTDLGLTLSTLPTVLRVFWLGAMEISFPACLIQMFCIHVFSFMES
HGPRBMY4  HSLHEPMYIFLCMLSGIDILISTSSMPKMLAIFWFNSTTIQFDACLLQMFAIHSLSGMES
O88628    RSLHAPMYLFLCMLAAIDLALSTSTMPKILALFWFDSREITFDACLAQMFFIHALSAIES
Q9WU89    RTLHEPMYVFLSMLAGTDILLSTTTVPKTLAIFWFHAGEIPFDACIAQMFFIHVAFVAES
Q9WVD9    RSLHEPMYFFLSMLALADLLLSTATAPKMLAIFWFHSRGISFGSCVSQMFFIHFIFVAES
Q9WU93    HSLHQPMFYLLAILAVTDLGLSTATVPRALGIFWFGFHKIAFRDCVAQMFFIHLFTGIET
Q9WVD7    KSLHIPMYIFLAILAVTDIALSTCILPKMLGIFWFHMPQISFDACLLQMELIHSFQATES

Q9WVN4    GVLLAMSYDRFVAICTPLHYNSILTNSRVMKMALGALLRGFVSIVPPIMPLFW.FPYCHS
Q9WVN5    GVLLAMSYDRFVAICTPLHYNSILTNSRVIAIGLGVVLRGFLSLVPPILPLFW.FSYCRS
Q9Y5P1    GSLLAMAYDRFIAIRNPLRYASIFTNTRVIALGVGVFLRGFVSILPVILRLFS.FSYCKS
Q9YH55    SVLLAMAFDRYVAICCPLRYSSILTGARVAQIGLGIICRCTLSLLPLICLLTW.LPFCRS
HGPRBMY4  TVLLAMAFDRYVAICHPLRHATVLTLPRVTKIGVAAVVRGAALMAPLPVFIK.QLPFCRS
O88628    TILLAMAFDRYVAICHPLRHAAVLNNTVTVQIGMVALVRGSLFFFPLPLLIK.RLAFCHS
Q9WU89    GILLAMAFDRYVAICTPLRYSAVLTPMAIGKMTLAIWGRSIGTIFPIIFLLK.RLSYCRT
Q9WVD9    AILLAMAFDRYVAICYPLRYTTILTSSVIGKIGTAAVVRSFLICFPFIFLVY.RLLYCGK
Q9WU93    FMLVAMAFDRYIAICNPLRYNTILTNRTICIIVGVGLFKNFILVFPLIFLIL.RLSFCGH
Q9WVD7    GILLAMALDRYVAICNPLRHATIFSPQLTTCLGAGALLRSLITTFPLILLIKFCLKYFRT

Q9WVN4    HVLSHAFCLHQDVMKLACADITFNLIYPVVLVALTFFLDALIIIFSYVLILKKVMGIASG
Q9WVN5    HVLSHAFCLHQDVMKLACADITFNRIYPVVLVALTFFLDALIIVFSYVLILKTVMGIASG
Q9Y5P1    HVITRAFCLHQEIMRLACADITFNRLYPVILISLTIFLDSLIILFSYILILNTVIGIASG
Q9YH55    HVLSHPYCLHQDIIRLACTDATLNSLYGLILV.LVAILDFVLIALSYIMIFRTVLGITSK
HGPRBMY4  NILSHSYCLHQDVMKLACDDIRVNVVYGLIVIISAIGLDSLLISFSYLLILKTVLGL.TR
O88628    NVLSHSYCVHQDVMKLAYTDTLPNVVYGLTAILLVMGVDVMFISLSYFLIIRAVLQLPSK
Q9WU89    NVIPHSYCEHIGVARLACADITVNIWYGFSVPMASVLVDVALIGISYTLILQAVFRLPSQ
Q9WVD9    HIIPHSYCEHMGIARLACDNITVNIIYGLTMALLSTGLDILLIIISYTMILRTVFQIPSW
Q9WU93    NIIPHTYCEHMGIARLACVSIKVNVLFGL.ILISMILLDVVLSALSYAKILHAVFKLPSW
Q9WVD7    TIISHSYCEHMAIVKLAAQDIRINKICGLLVAFAILGFDIVFITFSYVRIFITVFQLPQK
```

FIG. 6B

```
Q9WVN4     EERKKSLNTCVSHISCVLVFYITVIGLTFIHRF.GKNAPHVVHITMSYVYFLFPPFMNPI
Q9WVN5     EERAKALNTCVSHISCVLVFYITVIGLTFIHRF.GKNAPHVVHITMSYVYFLFPPFMNPI
Q9Y5P1     EERAKALNTCISHISCVLIFYVTVMGLTFIYRF.GKNVPEVVHIIMSYIYFLFPPLMNPV
Q9YH55     EEQTKALNTCVSHFCAVLIFYIPLAGLSIIHRY.GRNAPPISHAVMANVYLFVPPILNPV
HGPRBMY4   EAQAKAFGTCVSHVCAVFIFYVPFIGLSMVHRF.SKRRDSPLPVILANIYLLVPPVLNPI
O88628     SERAKAFGTCVSHIGVVLAFYVPLIGLSVVHRF.GNSLDPIVHVLMGDVYLLLPPVINPI
Q9WU89     DARHKALNTCGSHIGVILLFFIPSFFTFLTHRF.GKNIPHHVHILLANLYVLVPPMLNPI
Q9WVD9     AARYKALNTCGSHICVILLFYTPAFFSFFAHRFGGKTVPRHIHILVANLYVVVPPMLNPI
Q9WU93     EARLKALNTCGSHVCVILAFFTPAFFSFLTHRF.GHNIPRYIHILLANLYVIIPXALNPI
Q9WVD7     EARFKAFNTCIAHICVFLQFYLLAFFSFFTHRF.GAHIPPYVHILLSDLYLLVPPFLNPI

Q9WVN4     IYSIKTKQIQRSILRLLSKHSRT~~~~~~~~
Q9WVN5     IYSIKTKQIQRSVLHLLSV~~~~~~~~~~~~
Q9Y5P1     IYSIKTKQIQYGIIRLLSKHRFSR~~~~~~~
Q9YH55     LYSMKSKAICKGLLRLLCQRAAWPGHAQNC~
HGPRBMY4   VYGVKTKEIRQRILRLFHVATHAS.EP~~~~
O88628     IYGAKTKQIRTRVLAMFKISCDKDIEAGGNT
Q9WU89     IYGAKTKQIRDS.MTRMLSVVWKS~~~~~~~
Q9WVD9     IYGVKTKQIQDR.VVFLFSSVSTCQHDSRC~
Q9WU93     IYGVRTKQIQDRAVTILCNEVGQLADD~~~~
Q9WVD7     VYGIKTKQIRDQVLKMFFSKKPL~~~~~~~~
```

FIG. 7

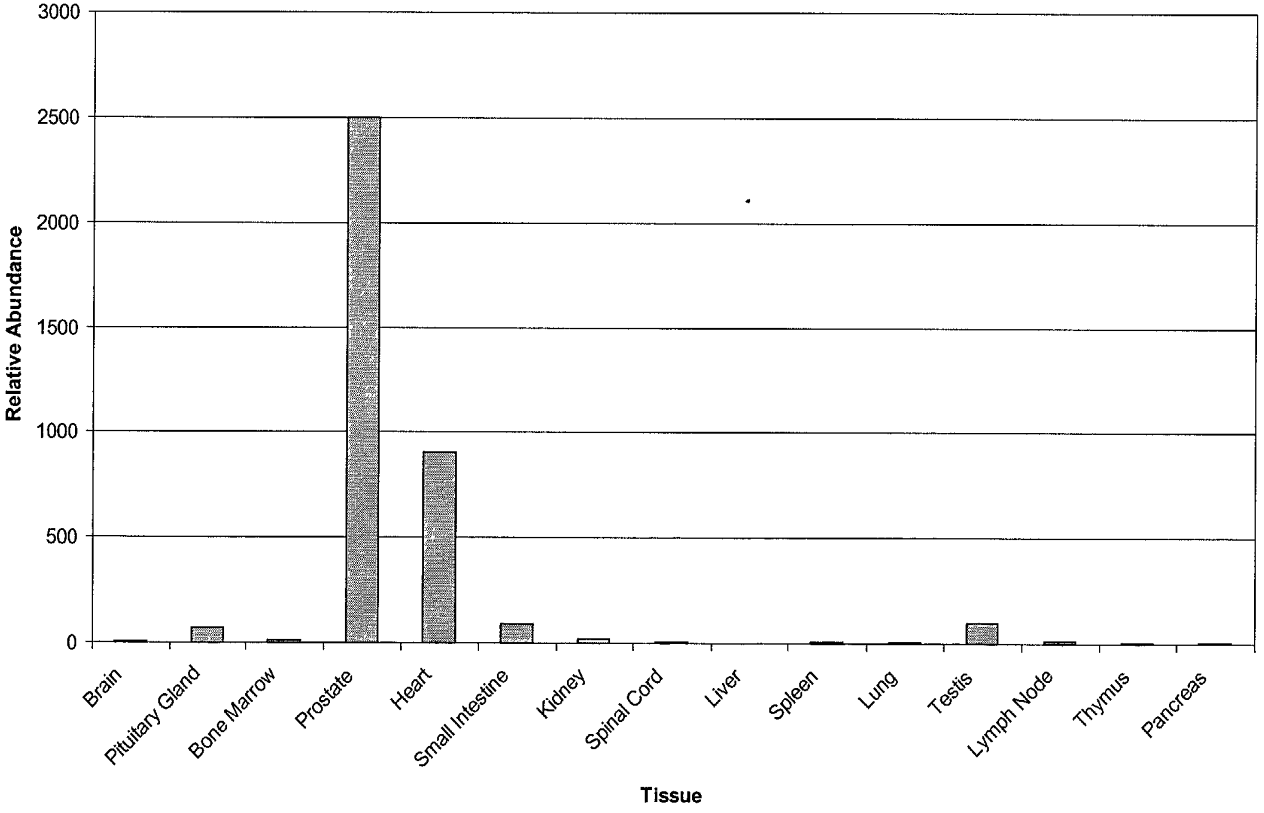

3000
2500
2000
1500
1000
500
0
Relative Abundance
Brain
Pituitary Gland
Bone Marrow
Prostate
Heart
Small Intestine
Kidney
Spinal Cord
Liver
Spleen
Lung
Testis
Lymph Node
Thymus
Pancreas
Tissue

FIG. 8

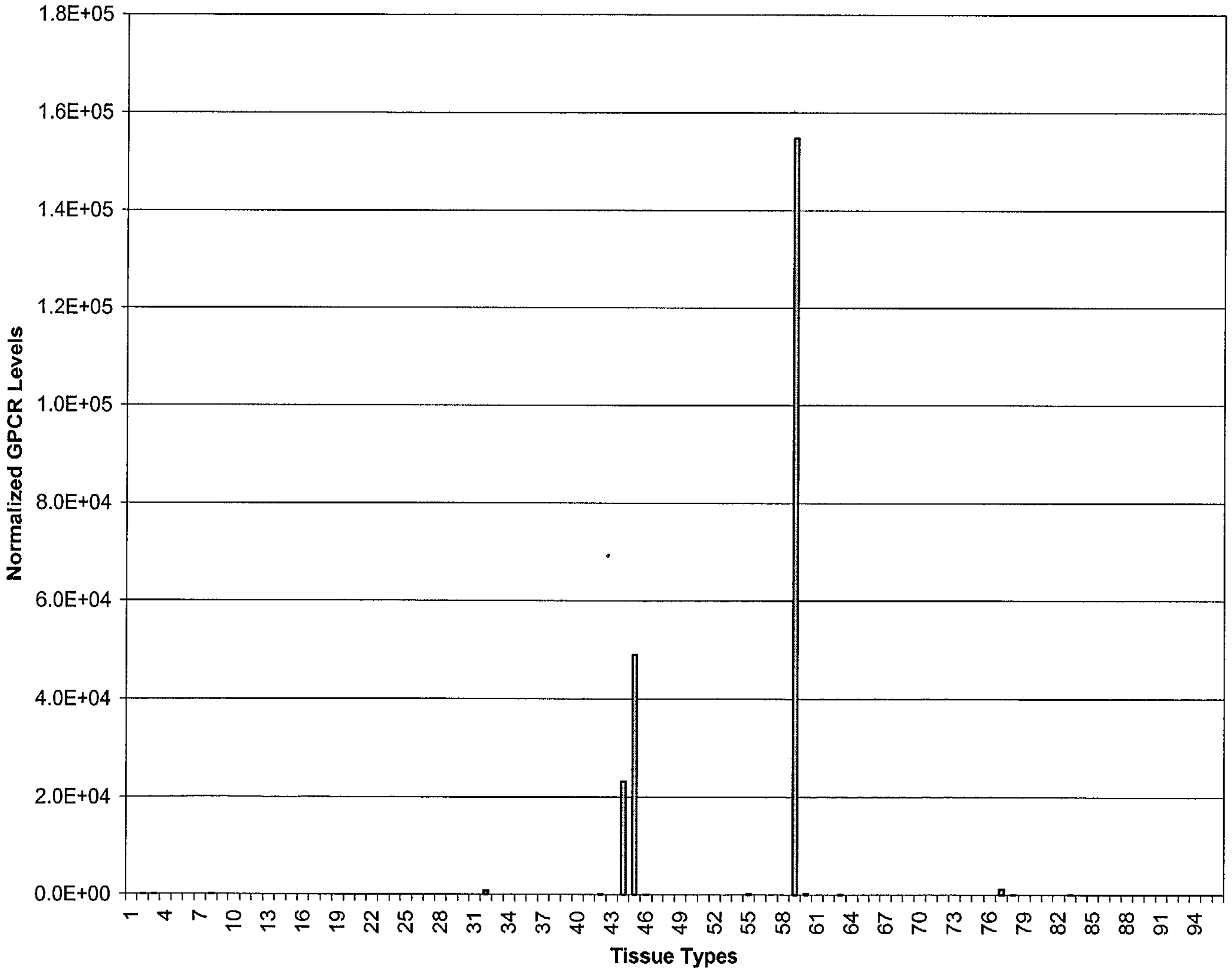

Normalized GPCR Levels
1.8E+05
1.6E+05
1.4E+05
1.2E+05
1.0E+05
8.0E+04
6.0E+04
4.0E+04
2.0E+04
0.0E+00
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
61
64
67
70
73
76
79
82
85
88
91
94
Tissue Types

FIG. 9

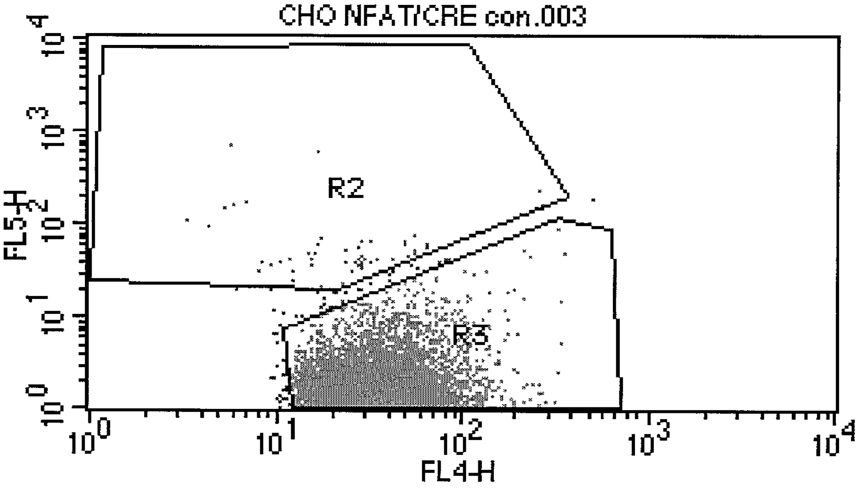

CHO NFAT/CRE con.003
R2
R3
FL5-H
FL4-H
10^0
10^1
10^2
10^3
10^4

FIG. 10

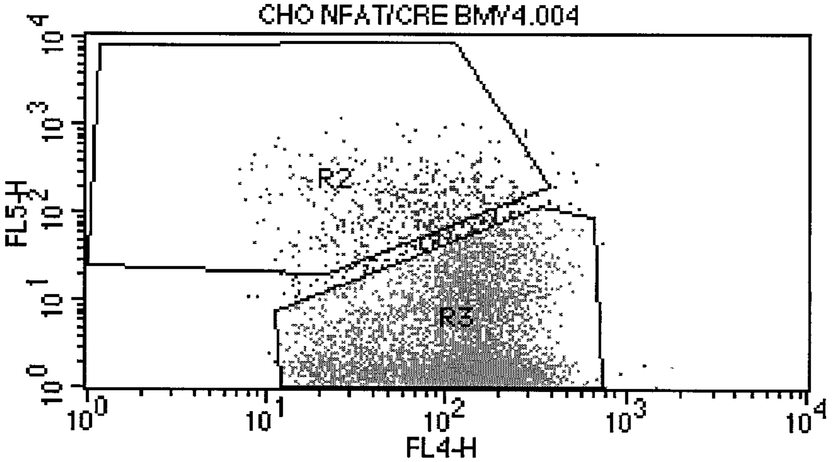

CHO NFAT/CRE BMY4.004
R2
R3
FL5-H
FL4-H
10^0
10^1
10^2
10^3
10^4

FIG. 11

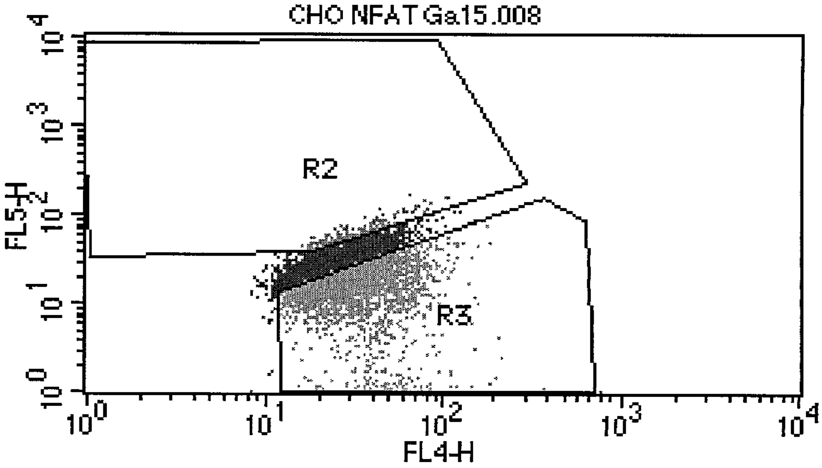

CHO NFAT Ga15.008
FL5-H
FL4-H
10^0
10^1
10^2
10^3
10^4
R2
R3

FIG. 12

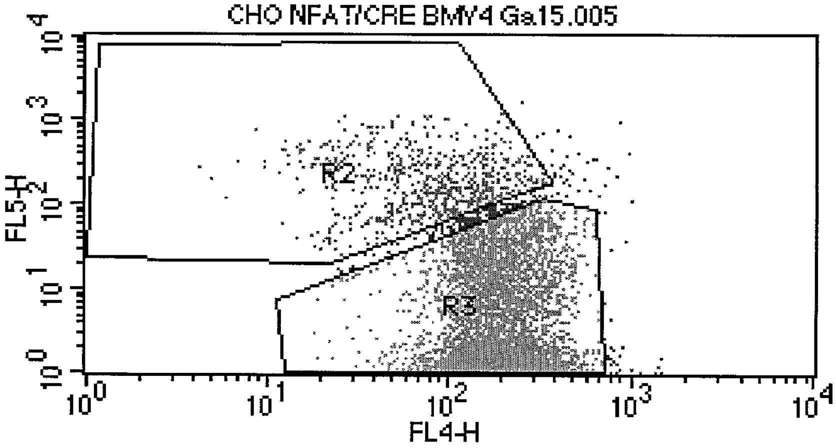
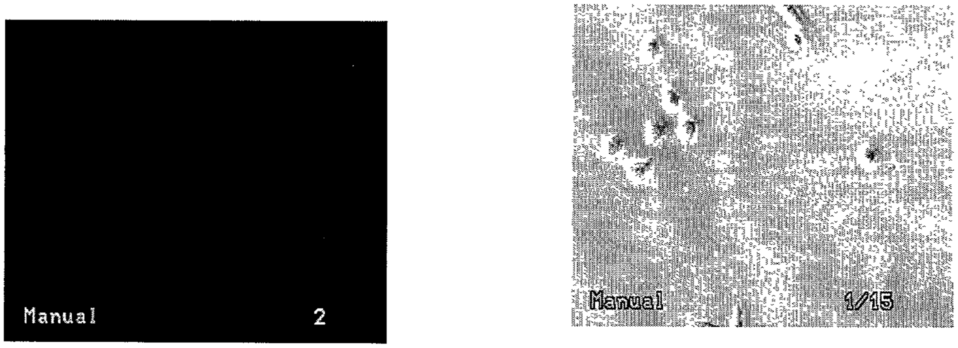

CHO NFAT/CRE BMY4 Ga15.005
FL5-H
FL4-H
10^0
10^1
10^2
10^3
10^4
R2
R3

FIG. 13.

a. CHO-NFAT G alpha 15 (Fluorescent vs. Bright Field)



b. CHO-NFAT Galpha 15 HGPRBMY4 (Fluorescent vs. Bright Field)

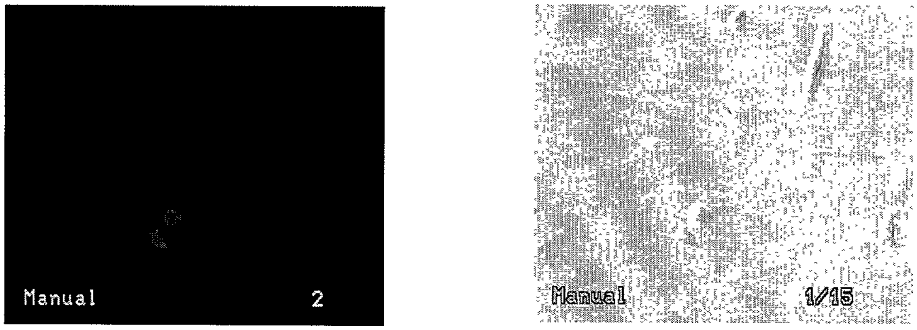
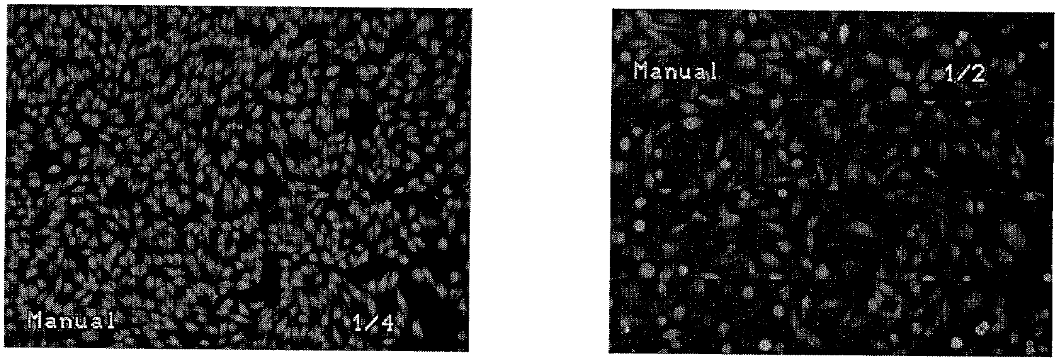


FIG. 14

a. CHO-NFAT/ CRE

b. CHO-NFAT/CRE + F/T/P



c. CHO-NFAT/CRE oGPCR-Intermediate

d. CHO-NFAT/CRE oGPCR High